

lasted for 3^s or 4^s ,—perhaps more, elongating as the moon advanced, and was at length suddenly retracted into her circumference, the end appearing broken or toothed. At the breaking of the annulus the phenomenon was different; the moon's limb continued to approach that of the sun, till, when very close, a portion of the former, about 30° in extent, suddenly flowed over in dark lines, with bright spaces between, which almost immediately vanished, the whole appearance not lasting above 2^s . The first appearance was like that shewn in Pl. I. Fig. 10 of the Society's *Memoirs*, vol. x., and the last more resembled Figs. 1 and 3 of the same plate, but the lines were more numerous though they could not be counted. The telescope used was a $3\frac{1}{2}$ -foot by Dollond, with a power of 40.

“Not being in good health, I was unable to make any further observations of importance, except that the temperature of the air fell during the eclipse from 87° to $84^\circ.5$, and rose again to $85^\circ.5$ at the termination; and that, while the annulus lasted, the sun's rays had scarcely a perceptible effect on the thermometer.

“The time of the retraction of the ligament was noted as that of the formation of the annulus; and the time when the lines began to run across as the time of the end of the same. No light could be seen round the moon's limb when *off* the sun, either before or after the annulus.”

BEADS IN ANNULAR ECLIPSES.

By the Rev. Professor Baden Powell.

The author considers the fact of the existence of the phenomenon in question as sufficiently well established, notwithstanding the equally admitted discrepancies in the accounts given of the appearance of the beads by different observers. Observers differ as to such points as the stationary or fluctuating character of the beads and the degree of their changes into threads; and they have sometimes been seen by one observer and not by another when the circumstances have been in some degree different. These discrepancies the author thinks due in some cases to the different coloured glasses employed, and in others to the loss of light, as, for example, when the images are projected on a screen. He thinks Mr. Caldecott's explanation of the tremulousness of the beads (as being due to atmospheric mirage) unsatisfactory, and is rather inclined with Mr. Airy to attribute it, in part, to the rapid decrease of the intensity of the sun's light near the borders.

The author considers the whole of the phenomena that have been observed to be due to two causes, viz. to the rapid decrease of light at the sun's edge, and to the acknowledged law of irradiation, that it increases with the increase of the intensity of the light.

This being allowed, he imagines that “any small opening or notch on the moon's edge will give rise to an enlarged image or patch of light by irradiation; and that this will be *much greater* as

the part occasioning it is further advanced on the sun's disk," thus the formation of *beads* is accounted for, and their elongation.

"Again, when the junction is broken, the same causes will account for the *widening* of the separation, and that in a *greater degree towards the sides* which are more remote from the circumference."

The author then proceeds to illustrate his explanation by means of diagrams applying to the different phases of the phenomenon; and he considers the principles laid down in explanation to possess the character of a "*vera causa*," though they may not suffice to explain all the phenomena.

Differences in the appearances of the beads as described by different observers must also be expected, both from the preceding theory, and from the circumstance that there are differences in the *power* and *aperture* of the *telescopes* employed; the author hopes shortly to be able to offer to the Society some contributions towards the better elucidation of this subject.

It is perhaps questionable whether the same principles will afford an explanation of certain apparently analogous phenomena observed in the transits of *Venus*; but, in general, the adherence of the planet to the limb of the sun by a neck at the point of junction, and the protuberance of the disk towards the same part of the separation, are appearances which agree sufficiently with the cause above assigned.

In a note appended to Professor Powell's paper, he alludes to the observations of the eclipse of October 9 of the present year, in which small beads were observed, with waving in the limb, but without increase, or elongations of the shadows into threads, or any other change. In the case of M. Schaub's observations, the complementary combination employed might, by the loss of light, have destroyed any effects of irradiation. Also, as the ring formed was very thin, the difference of the intensities of the sun's light for the breadth of the band would be very small; and thus the causes above referred to might not act to a perceptible extent: the whole of the phenomena might be simply accounted for, as M. Mauvais observes, by the mere consideration of the irregularities of the moon's limb as it just touched that of the sun.

Results deduced from the Occultations of Stars and Planets by the Moon. Observed at Cambridge Observatory from 1830 to 1835. By the Astronomer Royal.

These occultations were reduced at the time in the most complete manner which was then practicable. A very approximate place of the star having been assumed, the apparent place of the point of the moon's limb at which the occultation took place was known, and by the application of the proper correction for parallax, the geocentric place of the same point for the instant of occultation was also known. The geocentric place of the moon's centre was